Laplace Homework 8 CENG 5431 Due April 22

If you have trouble with Laplace Transforms, study my Chapter 9 on the WEB under CENG 5131. Try out the MATLAB symbolic command **ilaplace** AFTER you have done the problems by hand.

Problem 1
20 Points
Compute the Laplace transform of the following functions by direct integration:

(a) $f(t) = 2t$

(b) $f(t) = t - 3$

(c) $f(t) = 2\sin t$

Problem 2
20 Points
Now compute the Laplace transform of the following functions by using the theorems, i.e. the shifting properties and the linearity property and the previous results in Problem 1:

(a) $f(t) = 3te^{3t}$

(b) $f(t) = e^{-2t}\cos 4t$

Problem 3
30 Points
By partial fraction expansion, after checking that the expansion is correct by multiplying the factors together, find the function $f(t)$ corresponding to the Laplace transform:

$$F(s) = \frac{120s}{(s-1)(s+2)(s^2-2s-3)}.$$

Problem 4
30 Points
Determine the solution of the following initial value problems using Laplace transforms and check the answer:

(a) $\dfrac{d^2y}{dt^2} + 4y = 0, \quad y(0) = 0,\, y'(0) = 10.$

(b) $\dfrac{d^2y}{dt^2} + y = 2 \quad y(0) = 0,\, y'(0) = 2.$